

APPLICATION FOR UNITED STATES PATENT

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Invention: **BAR CODE SYNCHRONIZATION PROCESS FOR SCANNING MAIL
ENVELOPES AND THEIR CONTENTS**

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1 **BAR CODE SYNCHRONIZATION PROCESS FOR SCANNING MAIL**
2 **ENVELOPES AND THEIR CONTENTS**
3

4 **CROSS-REFERENCE TO RELATED APPLICATIONS**

5 This application is based upon and gains priority from U.S. Provisional Patent
6 Application Serial No. 60/390,861, entitled "Bar Code Synchronization Process For Scanning
7 Mail Envelopes and Their Contents", filed with the U.S. Patent and Trademark Office on June
8 20, 2002 by the inventors herein, the specification of which is incorporated herein by reference.

9
10 **BACKGROUND OF THE INVENTION**

11 1. Field Of The Invention.

12 The invention disclosed herein relates generally to methods and systems for digital mail
13 management, and more particularly to a method and system for enabling the high speed
14 processing of physical mail articles to convert the same into electronic documents that may be
15 electronically distributed to the original intended recipient without requiring the intended
16 recipient to come into contact with the original, physical mail article.

17
18 2. Description of the Background.

19 Individuals, corporations, government entities, and every other party that receives mail
20 has become increasingly concerned over the threat of contaminated mail. Terrorist events in the
21 United States in 2001 relating to anthrax-laced mail have caused great concern, and at times near
22 panic, over the health threat a person may realize simply by opening a new piece of mail. Since
23 the realization that such a terrorist threat does truly exist, a need has been realized to implement a
24 safeguard that could neutralize the threat of contaminated mail without degrading the general
25 conveniences and limited costs associated with traditional mail delivery.

1 One avenue to reduce the risk posed by terrorist attempts to contaminate the mail is to
2 prevent distribution of the physical, potentially contaminated mail article to the intended
3 recipient. However, if such recipient is still to receive the information contained in the original
4 mail document(s), a substitute for such physical article must be provided. Such a substitute may
5 take the form of an electronic message including scanned images of the contents of the original,
6 potentially contaminated mail article. In this case, the physical mail article may be delivered to a
7 remote facility employing appropriate safety measures to neutralize the threat of possible
8 contaminants, opened and scanned at such facility, and thereafter delivered digitally to the
9 intended recipient. However, providing a viable digital delivery system, or a method or system
10 for converting a large number of physical mail articles into a form which may be easily and
11 accurately distributed electronically has heretofore not been accomplished.

12 More particularly, while high speed processing would require high speed scanning
13 equipment that could process mail articles in batches, prior known methods and systems for
14 digitizing mail articles have required the processing of each mail article through smaller, slower
15 scanners because envelopes and their contents cannot be confidently scanned in batch mode.
16 Batch scanning generally requires some consistency with thickness and size of the documents
17 within the batch. Ordinarily, envelopes are thicker but smaller in size than their contents.
18 Likewise, envelopes are generally open at the top end and must be scanned bottom first to
19 prevent misfeeds. Thus, in order to prevent misfeeds, all documents in a batch must have their
20 leading edges on the same line (with the closed envelope edge in the proper orientation) for
21 feeding into a scanner. Unfortunately, it is extremely difficult and time consuming to get the
22 leading edges of a mixed batch of envelopes and contents (i.e., a batch comprised of envelopes
23 and their contents interspersed with one another) to properly align. Therefore, it is more likely to

1 get a scanner jam or double feed or scan out of order in a mixed batch. In a production scanning
2 environment, it would thus be much more efficient to scan envelopes in batches and contents in
3 other batches.

4 However, scanning envelopes and contents in their own separate batches provides its own
5 difficulties. While address information is at times available on both the contents and the outside
6 of the envelope in which they are shipped, there are often times when address information of the
7 sender is only available on the envelope. Thus, if batches of envelopes and batches of contents
8 are scanned separately, it is necessary that a process for synchronizing the data and images of
9 the separate batches be provided.

10 It would therefore be advantageous to provide a method and system for scanning mail
11 documents separated into envelope and contents batches, while enabling synchronization of such
12 scanning process to ensure association of all relevant data for each mail article.

14 SUMMARY OF THE INVENTION

15 A method and system for enabling the transfer of information within physical mail
16 articles without risking exposure of the intended recipient to hazardous contaminants in the
17 physical mail article are disclosed herein. In a preferred embodiment of such method and
18 system, the physical mail items are preferably scanned in separate batches of envelopes and
19 contents, and the production of electronic documents from the physical originals is preferably
20 managed through the use of multiple bar code sets having the same identifiers for different sets.

21 In a preferred embodiment of the method and system for scanning mail documents set
22 forth herein, envelopes and their contents are separated into envelope batches and contents
23 batches, and bar code labels are attached to items in each batch. The bar code labels preferably

1 have at least a numerical portion, and the numerical portions of the bar code labels are identical
2 between the two sets, thus enabling correlation between a particular envelope and its contents
3 even after they have been separated from one another. Once the bar code labels are applied, the
4 batches are scanned independently of one another, and the listing of bar codes in each batch are
5 written to a file. Thereafter, the bar code listings for related envelope and contents batches are
6 compared to one another to locate missed bar codes in either batch, in turn prompting further
7 inspection of a precise document in a batch to diagnose the cause of the error. Such batch
8 processing thus enables high speed processing of the physical documents for conversion into
9 electronic form, and automated analyses to quickly and accurately diagnose misread or
10 unscanned pages.

11 12 **DESCRIPTION OF THE DRAWINGS**

13 Figure 1 is a schematic representation of an exemplary method for preparing documents
14 for scanning according to a first aspect of a preferred embodiment of the invention.

15 Figure 2 is a schematic representation of an exemplary method for scanning documents
16 according to another aspect of a preferred embodiment of the invention.

17 Figure 3 is a schematic representation of an exemplary method for automatically
18 comparing scanned batches of documents according to yet another aspect of a preferred
19 embodiment of the invention.

1 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

2 The invention comprises a method and system for enabling the transfer of information
3 within physical mail articles without risking exposure of the intended recipient to hazardous
4 contaminants in the physical mail article.

5 While traditional bar code labeling methods and systems have provided for the printing
6 and/or production of bar codes having unique numbers such that each bar code may be uniquely
7 distinguished, a preferred embodiment of the method and system of the invention generates two
8 sets of sequentially numbered lists of bar code labels, such that one set may be associated with
9 the envelopes of a batch of mail articles, while the other set may be associated with the contents
10 of the same batch of mail articles. Each of the two sets is preferably provided one or more alpha-
11 numeric characters that associate each label with one of the two sets, and a unique number
12 identifying a particular mail article in each set. For example, one of the two sets may be
13 prefaced with a character string such as E or ENV, signifying a label set to be associated with the
14 envelopes in a single batch, and the other set may be prefaced with a character string such as C
15 or CON, signifying a label set to be associated with the contents of that batch. Of course, any
16 other combination of alpha-numeric characters may also be used in such embodiment of the
17 invention, so long as the character strings distinguish the envelope set from the contents set.
18 Preferably, in an embodiment of the invention in which the bar code labels are applied to the
19 batches by hand, the bar code labels are printed in such fashion that envelope labels and content
20 labels are interspersed on a single sheet. Thus, for example, in a sheet of labels having multiple
21 rows and columns of bar code labels, proceeding down a single column, the bar code labels
22 would be produced such that a first label may, for example, have the prefix ENV followed by a
23 numeral, the second label would have the prefix CON followed by the same numeral, the third

1 label would have the prefix ENV followed by a second numeral (preferably a single numerical
2 iteration away from the first numeral), the fourth label would have the prefix CON followed by
3 the second numeral, and so on throughout the entirety of the labels on the sheet. In this way, a
4 human label applicator may easily follow an organized sequence for labeling batches without
5 having to switch between label sheets, in turn reducing the risk of human error resulting in
6 mislabeled items.

7 As mentioned above, the other portion of each bar code label includes a number
8 identifying a particular mail article in each of the envelope and content sets. The number portion
9 of the bar code is identical for each set. Thus, for example, in a batch initially comprised of 30
10 envelopes and their contents (which becomes separated into a stack of 30 envelopes and a
11 separate stack of their associated contents), the two sets of labels may comprise a first set having
12 labels formatted as ENV0001, ENV0002, . . . ENV0030, with the second set having labels
13 formatted as CON0001, CON0002, . . . CON 0030.

14 As shown in the schematic view of Figure 1, in addition to preparation of the coordinated
15 sets of bar code labels, at step 100, a preferred embodiment of the invention also requires that the
16 envelopes and contents be physically prepared. At step 200, an initial sort may be provided in
17 which envelopes of like size are collected into groups, and batches (e.g., batches of 30 envelopes
18 with their contents) are pulled from each such group of like-sized envelopes. In this way, each
19 envelope batch will be of uniform size so as to minimize the risk of document feed errors in the
20 scanning equipment. After such sorting of like-sized envelopes and selection of a batch
21 therefrom, the envelopes of the batch are opened and their contents extracted at step 210, thus
22 forming a batch of envelopes and a batch of contents. Bar code labels conforming to the
23 numbering scheme outlined above may then be applied at step 220 as follows.

1 With both the envelope and contents batches arranged in corresponding order, a label
2 from the label set corresponding to the envelopes is applied preferably to any open space on
3 either the front or back of each consecutive envelope, until the envelope bar code labels for that
4 batch are fully expended. A label from the label set corresponding to the contents is likewise
5 applied to each set of contents. If the first page of the contents is one-sided, and thus has an
6 available blank back side, the label is preferably applied to the blank, back side of the first page.
7 If the first page is two-sided, a blank page is preferably inserted at the front of the contents, and
8 the label is applied to such newly inserted blank page. Thus, each item of contents will
9 preferably have at least one page that is blank bearing a bar code label. As will be explained in
10 greater detail below, the application of the label to a blank page allows for a highly efficient
11 automated sort of scanned content pages to identify only those scanned images that contain bar
12 codes, based simply on the known image file size of a blank page of paper having only a bar
13 code placed thereon. Such a sorting of only those pages bearing bar codes enables a system
14 operator to quickly view a series of bar code labels scanned in a single batch, and likewise
15 promptly identify any bar codes (and associated contents) that are missing or not in appropriate
16 consecutive order in a batch. It should be noted that while for simplicity, the labels can be
17 applied by a human clerical employee, the application of the bar code labels may likewise be
18 achieved through the use of automated labeling equipment which physically applies the labels to
19 the free space of an envelope or a blank page in the contents documents, or may even be printed
20 thereon, without departing from the spirit and scope of the invention. Thus, as used herein, the
21 term "label" is intended not to be limited to an adhesively applied label bearing a barcode, but
22 any alpha-numeric character string or machine-readable data printed or otherwise placed on the

1 envelope or contents page so as to mark that document with an associative identifier linking it to
2 its envelope/contents counterpart.

3 So as to reduce the risk that corresponding envelope and content bar code labels are
4 misapplied to individual envelopes or content collections that do not in fact correspond with one
5 another, it is advisable that the application of labels be performed pursuant to a continuous
6 process of applying an envelope label first to the open space of the envelope, opening the
7 envelope and extracting the contents, applying the associated contents label to the back side of
8 the first page of the contents (or inserting a blank page having such bar code label), and adding
9 the newly labeled envelope and contents set to their respective batches.

10 Once a batch of envelopes and corresponding contents has been so labeled, a blank sheet
11 bearing a batch bar code label is preferably placed with each batch at step 300 so as to uniquely
12 identify each batch. The bar code labels applied to associated batches of envelopes and their
13 contents preferably include the same number so as to establish the correlation between the
14 associated envelope and contents batches. Moreover, as with the bar code labels associated with
15 the individual envelopes and their contents, the labels associated with separate batches may
16 include an alpha-numeric character string to identify the batch as either an envelope batch (such
17 as by inclusion of the character string "ENV" or "BENV") or a contents batch (such as by
18 inclusion of the character string "CON" or "BCON"). By associating such a separate batch
19 identifier with each batch, associated batches of envelopes and their contents remain linked by
20 the machine-readable batch identifier, thus enabling the entirely separate processing of envelope
21 and contents batches.

22 The bar code label applied to such sheet may also be used to provide a signal to the
23 scanning equipment that a new batch is queued for processing. More particularly, the scanning

1 control software may be configured to recognize a particular bar code label as a batch bar code
2 label. Thus, when a new batch bar code label is scanned, the software may automatically create
3 a new database batch file identifiable by the batch bar code, scan the documents (envelopes or
4 contents) that follow, and save the scanned images to the database batch file associated with that
5 batch bar code label, in turn creating an electronic library of scanned images sorted into their
6 respective batches.

7 Further, it is preferred that the blank sheet to which the batch label is attached be a sheet
8 having a distinct color, such as a pastel color, so as to enable a human operator to readily
9 distinguish separate batches while ensuring that an appropriate resolution is maintained between
10 the graphics on the label and the sheet itself. This ensures that the bar code label remains
11 distinguishable from the paper sheet to which it is applied.

12 As mentioned above, after the batches have been prepared as above with bar code labels,
13 scanning and automated document processing may proceed at step 400. Each batch, whether
14 envelopes or contents, is scanned using high speed scanning equipment. Separation of the
15 batches into like-sized envelopes and separate contents allows such high speed scanning to
16 proceed with reduced risk of misfeeds.

17 As shown in the schematic view of Figure 2, each envelope batch is scanned preferably
18 so as to create an electronic image of the front and back of each envelope. The electronic images
19 are preferably stored in memory or on a hard drive that is in communication with, for example, a
20 controlling microprocessor having control logic thereon (preferably in the form of software),
21 which control logic operates and controls the system. Additionally during such scanning
22 process, each envelope bar code label is scanned and a file is written that lists all of the
23 individual envelope bar codes scanned in the batch, as well as the general envelope batch bar

code applied to the blank sheet at the start of the batch. Such file is also preferably stored in memory or on a hard drive, and is particularly linked to the electronic images corresponding to such batch. For example, the images and bar code data may be managed by a database software program, with the images, individual envelope bar codes, and general batch bar code together comprising a single "batch record" in the database.

Likewise, each contents batch is scanned so as to create an electronic image of the front and back of each contents page. These electronic images are also preferably stored in memory or on a hard drive as set forth above. Further, each contents bar code label is likewise scanned during the scanning process, and a file is written that lists all of the individual contents bar codes scanned in the batch, as well as the general contents batch bar code applied to the blank sheet at the start of the batch. This file is also stored in memory or on a hard drive, and as with the envelope batches, it is particularly linked to the electronic images corresponding to such batch.

It should be noted that because the contents and envelope batches are entirely separate from one another, and once scanned, are indexed via the batch bar code labels so that corresponding electronic envelopes and contents files may be identified, their physical processing and scanning may be carried out independently of one another.

Once corresponding batches of envelopes and contents have been scanned and the computer files listing all individual bar codes identified in a scanned batch are generated, an automated bar code comparator software program is initiated to confirm at step 500 (Figure 3) correlation of the elements in related envelope and contents batches. Preferably, initiation of such comparator software program occurs automatically upon saving a completed new batch file to the database, whether such batch comprises envelopes or contents. Upon the completion of a new batch file, the software program thus automatically checks to see if the correlating envelope

1 or contents batch file has yet been created and, if it has, initiates the following comparator
2 process. First, the comparator at step 510 retrieves from a batch record the bar code input from
3 scanning the bar code label attached to the blank sheet at the start of an envelope or contents
4 batch (i.e., the “batch bar code”), and likewise retrieves the list of individual bar code numbers
5 for the elements in that batch that have been scanned. The comparator then at step 520 locates
6 the corresponding envelope or contents batch record by finding the corresponding batch that
7 shares the same batch bar code numeral, but with a differing prefix identifying the batch as either
8 an envelope or contents batch. Once located, the comparator retrieves from the located batch
9 record the list of individual bar code numbers for the elements in that batch.

10 Once the individual bar code numbers have been so retrieved, at step 530 the comparator
11 analyzes each list of bar code numbers to determine whether a 1:1 correlation exists between the
12 numerical portions of the bar codes in the two lists. In the event that a 1:1 correlation does exist,
13 further automated processing of the batches in preparation for electronic delivery may proceed,
14 as further set forth below. However, in the event that a 1:1 correlation does not exist, a list is
15 preferably generated at step 540 of any bar code numerals in corresponding envelope and
16 contents batches that are present in only one of those batches. Such presence of a particular bar
17 code numeral in only one of the corresponding batches indicates that the other related batch
18 contains one or more documents which were not properly scanned, and thus requires
19 intervention. When such a “missing” bar code numeral is identified, the system retrieves the
20 images scanned in each of the two related batches, and preferably displays them to a human
21 operator. The human operator may then at step 550 sort the scanned images by file size, and
22 display only those images having a file size corresponding to a blank page having only a bar
23 code placed thereon. By viewing those bar code pages, the user may thus readily visually

1 identify the nature of the problem, such as whether documents were entirely missed during the
2 scanning process, or if a bar code label was simply misapplied such that the system was
3 incapable of properly reading that particular bar code label. After diagnosing the particular
4 problem, the operator may then take whatever corrective action is necessary, such as rescanning
5 pages that were missed in the original scan, or confirming that the error was due to a misapplied
6 or damaged (and thus unread) bar code label, in which case the operator may manually modify
7 the batch record adding the previously unread bar code. Alternately, the operator may simply
8 confirm during their visual review that all documents in each batch were scanned despite an
9 unread bar code, and in turn release both batches for further processing.

10 Once the batches have either been confirmed to have a 1:1 correspondence in bar code
11 numerals, or have been corrected or manually reviewed, approved, and released for further
12 processing, the system then merges the corresponding batch records into a single batch record
13 comprised of individual envelope and contents records, and then within each batch, further
14 processes each combined envelope and contents record. Each such combined record may be
15 formatted for data entry, e.g., entering an electronic address (such as an email address) for the
16 intended recipient of the combined record. The combined records may also optionally be
17 subjected to an optical character recognition (“OCR”) process to convert all or a portion of the
18 envelope and contents data to a format other than an image file. In any event, once the
19 designated recipient for a combined envelope and contents record has been identified, that record
20 may be dispatched electronically to the intended recipient, thus providing them the full
21 informational content they were intended to receive, without incurring risk of potentially
22 contaminated mail articles.

1 Preferably, for use in a production environment, a high speed scanner is utilized to scan
2 the envelopes and contents. Suitable high speed scanning equipment may include, by way of
3 example, a Kodak Imagelink 9500, which units are readily commercially available. Further, the
4 computer software necessary to implement the method of the instant invention may be
5 configured to run on a Windows platform, a UNIX platform, or any other operating system.
6 Moreover, while the above description of a preferred embodiment of the invention particularly
7 describes manual sorting of documents, label application, etc., it should be noted that automated
8 mail handling apparatus may likewise be used. For example, U.S. Patent No. 6,196,393 entitled
9 "Extraction and Scanning System" (the specification of which is incorporated herein by
10 reference) discloses an automated system for opening and scanning the contents of envelopes
11 and storing such image in digital form in a file. Such apparatus may be suitable for automating
12 the mail item opening and scanning processes described herein, so long as such apparatus is
13 operated so as to scan both envelopes and their contents in separate batches.

14 Having now fully set forth the preferred embodiments and certain modifications of the
15 concept underlying the present invention, various other embodiments as well as certain
16 variations and modifications of the embodiments herein shown and described will obviously
17 occur to those skilled in the art upon becoming familiar with said underlying concept. It should
18 be understood, therefore, that the invention may be practiced otherwise than as specifically set
19 forth herein.